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ABSTRACT

This report makes the case for school-to-work as a college preparatory strategy by presenting relevant evidence and by suggesting policies that will facilitate the college preparatory potential of school-to-work. The report begins by explaining why parents, students, and educators should care whether school-to-work can successfully prepare students for college. Then, the report describes the basic characteristics of school-to-work, emphasizing how these characteristics differ from other more school-based reform efforts. It discusses these three basic elements of school-to-work: "learner centered" or "authentic" teaching; guided educational experiences outside the traditional classroom, particularly in the workplace; and a structured approach to help youth begin to form ideas about their future aspirations and how to achieve them. The next section presents empirical evidence that school-to-work programs have been successful in teaching academic skills and preparing students for college. Also discussed is the college admissions process and strategies that reformers are using to help school-to-work students gain access to selective colleges, such as accommodation of the school-to-work program within the existing college admissions system; the communication between individual schools and colleges; and attempts at broad change in assessment and college admissions procedures. Contains 55 references. (YLB)

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SCHOOL-TO-WORK FOR THE COLLEGE BOUND

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Institute on Education and the Economy
Teachers College, Columbia University

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Executive Summary

In 1994, the School-to-Work Opportunities Act articulated an educational reform that included innovative approaches to classroom teaching, guided learning experiences outside the classroom, usually at work, and increased career counseling and guidance. Initially, this approach was seen as most appropriate for students not headed for college. But researchers now see that it has the potential to serve as a model for all secondary schools—that school-to-work can prepare young people for work and college. This report makes the case for school-to-work as a college preparatory strategy, arguing that it can teach academic skills as well as and possibly even better than more traditional approaches. By making this case, we hope to expand the use of school-to-work so that all students have the opportunity to benefit from it.

The principal barriers to the widespread acceptance of school-to-work as preparation for careers and college are (1) the fear of many parents and teachers that the school-to-work strategy is designed to prepare students for work directly after high school or at most after community college; (2) the belief that enrolling in a school-to-work program might divert students from academic learning and weaken their preparation for college; and (3) an existing college admissions process that relies on traditional measures of student achievement. Even if it were demonstrated that school-to-work could be used to teach the skills required for successful transition to college, some parents fear that college admissions procedures and standards would not recognize that competence. This fear has considerable justification since college admissions requirements are still based on Carnegie units–the accumulation of classroom hours in traditional academic subjects. The classroom teaching approach and work-based learning that characterize the school-to-work strategy do not fit easily into the traditional Carnegie structure.

Yet a good deal of the skepticism of school-to-work is based on misconceptions about its characteristics. In fact, the pedagogical arguments used to support school-to-work apply to all learning, not just learning for some students. A basic element of school-to-work is "learner-centered" or "authentic" teaching, which requires students to think, to develop in-depth understanding, and to apply academic learning to important, realistic problems. This pedagogic approach already

has widespread support among many teachers and parents, yet few realize that this is a core component of the school-to-work strategy. The second basic element is guided educational experiences outside the classroom, particularly the workplace. Many researchers have come to see that this approach strengthens and increases the amount of knowledge that is learned, understood, and retained. For most professionals—teachers, architects, doctors, lawyers—internships and other types of work experience are central components of their education. The jobs that students take in connection with school-to-work are designed to contribute to the student's substantive education. The third basic element of school-to-work is a structured approach to help young people think systematically about their aspirations and how they can achieve them. School-to-work can then build on those interests and aspirations to help motivate interests in academic learning. Although many high school and college students work while in school, most of these jobs have nothing to do with their studies.

This report describes school-to-work programs that emphasize academic skills, and presents empirical evidence that these programs have been successful in teaching academic skills and preparing students for college. If programs are well planned, students can learn academic skills, earn high grades, score well on tests, and gain access to college. However, widespread acceptance of school-to-work as a strategy for preparing students for selective colleges will require significant changes in assessment and college admission procedures.

Although these are long-term goals, steps can be taken now to improve the reform's potential to prepare students for college and to convince students, parents, and teachers that enrollment in a school-to-work program will not impede college aspirations. One important step would be to integrate the school-to-work movement into broader education reform efforts. Skeptics are justified in asking for more systematic evidence on the effects of this strategy on academic skills. High schools and school-to-work advocates can also begin to develop a broad strategy for working with colleges. Strengthening communication between secondary and postsecondary education requires three broad components.

The first component of stronger communication involves accommodating school-to-work activities into a traditional college preparatory program. This requires both trying to "shoe horn" school-to-work into traditional Carnegie units and

adding school-to-work activities to all of the traditional school activities—in effect treating school-to-work like an extra-curricular activity.

The second component is based on strengthening the relationships between individual schools and colleges. Indeed, the direct relationships between individual schools and colleges is already an important component of the college admissions process. The specific knowledge gained in these relationships is used by admissions committees to evaluate the significance of grades, recommendations, and extra-curricular activities. In some cases, high school teachers and counselors have been able to take advantage of these individual relationships to overcome the skepticism of non-traditional records among college admissions personnel.

Third, assessment and college admissions systems need to be reformed. Indeed several states are now developing assessment and admissions systems that can more effectively evaluate the achievements of school-to-work students. All of these cases involve the development of competency based assessments. Moreover, this is also consistent with a much broader movement in education towards the development of "authentic" assessment. If assessments include more complex material such as papers, projects, and portfolios, it may be that students with a well designed school-to-work experience will look better than students in traditional programs. Colleges already appreciate outside interests and commitments. In principle, school-to-work tries to integrate such interests with academic learning. Assessments that can capture that integration should be of particular interest to colleges.

Thus in the short term, if school-to-work is to spread as a strategy for preparing students for college, it requires better articulation of its characteristics and known effects, accommodation with traditional college preparatory systems, and the development of better individual relationships between schools and colleges. In the long term, school-to-work advocates need to improve the research base, better integrate the strategy with broader education reform movements, and develop new assessment and college admissions systems. While there are still many substantive questions that need to be resolved, school-to-work represents a significant change in educational strategies with the potential to benefit all students by better preparing them for college and career opportunities.

Introduction

In 1994, the School-to-Work Opportunities Act articulated an education reform strategy that included innovative approaches to classroom teaching, guided learning experiences outside of the classroom, usually at work, and increased career counseling and guidance. The original impetus for this reform was a growing anxiety during the 1980s that America's youth were not prepared for the rapidly changing world of work, a view that gained support from well-publicized complaints by business about the quality of many of their applicants (Bassi 1996; Smith 1996). Initially, the school-to-work strategy was seen as appropriate for the "non-college bound" or the "forgotten half." It was this middle half—those who were not headed for college but who did not have such serious problems—who had been forgotten. [1]

The problems with the education of the "middle half" had particularly serious economic consequences since these were the individuals who actually carried out the work in the core manufacturing and service industries.[2] Thus, school-to-work programs have tended to focus on developing a strategy for this segment of the student population. Indeed, a recent Department of Labor (1995) report stated that current school-to-work programs tend to recruit students from the "middle . . young people who probably would not enroll in college and do not have severe academic or behavioral problems (p17)."

Since the early 1990s, views about the school-to-work strategy have evolved. Advocates now argue that the approach has the potential to serve as a basic model for all secondary schools.[3] The 1994 Act emphasizes that its funded programs

[1] According to this view, the American education system served the college-bound student well (the "top quarter") and while there was still much to be done for students who faced serious economic, social, and educational problems (the "lower quarter"), at least this group had not been "forgotten" since a quarter century of social policy had attempted to address the educational barriers they faced.

[2] This position was articulated by W.T. Grant Foundation (1988) and Commission on Skills in the American Workforce (1990).

[3] See Kazis and Goldberger (1995) for examples. Prominent examples of school-to-work strategies were also showcased at a 1996 conference titled "The New American High School" that was organized by the Department of Education and the National Center for Research in Vocational Education. See also, Business Week (1996) for descriptions of ten "new American high schools" that use an integrated academic-vocational curriculum as the basis for whole-school reform.

should prepare students for high-quality careers but also maintain student options for postsecondary education. Thus, school-to-work should prepare young people for work *and* college.

The school-to-work model as it was originally conceived appears to have wide support from a variety of constituencies.[4] Many parents, teachers, educational administrators and counselors, college admissions personnel, and employers, however, are skeptical about its potential as a means to prepare students for college. For example, in 1995 the polling organization, Public Agenda, conducted a series of focus groups in Westchester County, a suburban New York county with many academically successful school districts that pride themselves on substantial Ivy League admissions from every high school class. The parents and teachers in these focus groups were uncertain of the strategy because they believed that it diverted students from academic learning and college preparation. "It's great for some kids, but not the college bound," observed one teacher. School-to-work was viewed as an approach which forces early career choices and is designed to prepare young people for employment in a specifically defined nonprofessional occupation immediately upon graduation from high school. School-to-work activities, especially work experiences or internships, would divert students from learning the academic skills and taking the competitive honors and Advanced Placement courses that they need to get into college. Extracurricular activities, another important consideration in college admissions, would also suffer. Even if the reform could be used to teach the skills required for a successful transition to college, parents feared that college admissions procedures and standards would not recognize that competence. Indeed, this fear has considerable justification since college admissions requirements are still based on the Carnegie units developed in the early 1900s as the standard unit of credit required for entrance to college.[5] The class-

[4] Researchers at Manpower Demonstration Research Corporation discuss the recognition among policy makers, educators and the public that students need programs such as school-to-work to help them make transitions from high school to postsecondary learning opportunities and to meaningful, productive, high-skill work (Pauly, Kopp, and Haimson 1994). Jobs for the Future, an organization that does extensive research in and offers support for school-to-work programs, began one of its recent publications by noting the consensus that has emerged in favor of building a school-to-career system in this country that offers well-defined learning pathways beginning in high school, integrated classroom and worksite learning, and high-skill employment (Goldberger and Kazis 1995).

[5] Carnegie units were first established by the Carnegie Foundation for the Advancement of Teaching and presented to colleges in their second annual report in 1907. Based upon the recommendations of panels set up by the National Education Association, the foundation advocated that 14 standard units of credit, each representing a minimum of 130 instructional hours, be required as evidence of substantial preparation for college admission (Maeroff 1994).

room teaching strategy and work-based learning that characterize school-to-work do not fit easily into the traditional Carnegie structure.

So far, advocates have not systematically made the case for school-to-work as a college preparatory strategy. The purpose of this report is to make that case by presenting relevant evidence and by suggesting policies that will facilitate the college preparatory potential of school-to-work. To be sure, there are many potentially important benefits to school-to-work other than teaching academic skills and preparing students for college. These include learning marketable occupational skills, learning what is expected on a job, and defining and understanding personal goals and aspirations. In addition, students can receive psychological and developmental benefits from having the experience of working in an adult world, being given responsibility, and being treated as an adult. One important conclusion of this report is that many of these "skills" are important in preparing students for college, but many parents, teachers, and college admissions officers and professors have the impression that these benefits can be gained only by compromising academic skills and by reducing college opportunities. We argue that compromising academic skill is not necessary and that the school-to-work approach has the potential to teach academic skills as well as and possibly even better than more traditional approaches.

In addition to teaching academic skills and preparing students for college, school-to-work benefits students by teaching marketable skills, demonstrating what is expected on the job, and helping to define and understand personal goals and aspirations. Students also receive psychological and developmental benefits from their experience working in the adult world.

We begin by explaining why parents, students, and educators should care whether school-to-work can successfully prepare students for college. We then describe the basic characteristics of school-to-work, emphasizing how those characteristics differ from other more school-based reform efforts. Following this description, the report presents some examples of school-to-work programs that emphasize academic skills and discusses how they enhance college opportunities. The next section presents empirical evidence that school-to-work programs have been successful in teaching academic skills and preparing students for college. We then discuss the college admissions process and review strategies that reformers are using to help school-to-work students gain access to selective colleges. The report

ends with conclusions and recommendations.

We argue in this report that school-to-work can be an effective strategy for teaching academic skills and preparing students for selective colleges. Nevertheless we do not want to understate the important advantages that the school-to-work approach can have for students who are not succeeding in traditional education or academically oriented students who choose to go to work immediately after high school graduation. We emphasize the college bound not because we believe that the school-to-work strategy should be exclusively for these students but because so many teachers, parents, and students are skeptical of its potential for providing the academic training necessary to gain admissions to college and be successful there. By making the case to this audience, we hope to expand the use of school-to-work so that all students have the opportunity to benefit from it.

The material used in this report is based on published and unpublished reports as well as extensive interviews with educators, analysts, researchers, and policy makers. In addition, during the past year, we have been engaged in field work at ten school-to-work sites where we have interviewed program administrators, teachers, counselors, and students. Many of the examples used in the report are drawn from this field work.[6]

[6] The ten programs were LaGuardia Community College in New York City; the Education for Employment School-to-Careers program in Philadelphia, Pennsylvania; the Kalamazoo County Education for Employment program in Michigan; the Greater Lehigh Valley Youth Apprenticeship Program in Pennsylvania; City-As-School in New York City; the Shell Youth Services Academy in Los Angeles; the New York City High School of Economics and Finance; the Genesee Area Skills Center in Flint, Michigan; the Madison-Oneida BOCES (Board of Cooperative Educational Services) Manufacturing Technologies Program in Verona, New York; and the Monroe I BOCES New Visions Medical Careers Program in Rochester, New York. We also interviewed by telephone the 10 showcase schools chosen for the New American High Schools conference sponsored by the Department of Education and the National Center for Research in Vocational Education.

Why Should We Care Whether School-To-Work Can Be Used to Prepare Students for College?

Throughout the near-panic about American education during the last two decades, higher education has maintained its highly regarded reputation. Much of the concern about education was generated by growing trade deficits and fears that Japanese and European schools were doing a better job in preparing the workforce. But the balance of trade in higher education was all in the favor of the United States. American colleges and universities enroll thousands of foreign students at the undergraduate, graduate, and doctoral levels each year, with the percentage of foreign students receiving degrees increasing dramatically as the level of education increases—nearly three percent of the Bachelor's degrees conferred in 1992-93 were to nonresident aliens; 12 percent of the Master's degrees; and 27 percent of the Doctor's degrees (U.S. Department of Education, National Center for Education Statistics 1995, Tables 256, 259, 262). Although a search for data on the number of American students who graduate from foreign universities yielded no reliable data, there is strong reason to suspect that the percentage of U.S. students enrolled in foreign universities is much lower.

The large majority of parents view college as the most important educational goal for their children.

Despite concern that the costs of higher education are rising too quickly, the discussion about financing rarely challenges the quality of higher education. Thus there is no sense of crisis in most of the high schools that prepare students for those universities. One of the common criticisms of American high schools—that they give students very little incentive to work hard—is not generally applied to the college-bound curriculum (Rosenbaum and Karyia 1989). The requirements for college admissions are well understood and many high school students with college aspirations work hard.

The large majority of parents believe that their children should go to college. In their report, *Assignment Incomplete: The Unfinished Business of Education Reform,* Public Agenda (1996) found that 83 percent of parents whose children were in

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primary and secondary school expected their children to go to college. In a review of school-to-work programs, researchers from Manpower Demonstration Research Corporation found that African American parents in particular saw college as the most important educational goal and they were not interested in enrolling their children in school-to-work unless they were convinced that the college option was at least kept open (Pauly, Kopp, and Haimson 1994). In general, these parents appear to have a good understanding of the realities of the labor market. A growing body of research suggests that college graduates earn much more than high school graduates—by 1990, the wage premium for a college graduate was 79 percent (Phillips 1996). Although this gap has been decreasing slightly for the last three years (in 1994, the gap decreased to 73 percent), it grew dramatically over the previous decade (Levy and Murnane 1992; Phillips 1996).

Given the reputation of U.S. colleges and the ability of many of the country's secondary schools to prepare students for those apparently high-quality institutions, why should the system be disturbed? What should parents do whose children are not enrolled in elite private and public college-prep schools but who nevertheless want those children to go to good colleges? It seems to make sense to try to emulate those elite schools. However, school-to-work programs have a difficult task in attempting to emulate elite schools given their association with vocational education, which has traditionally enrolled students who are explicitly not headed for college.

Generally in international surveys, the " best students" in the United States do less well when compared with the "best students" from other countries on science and math tests.
(National Center for Education Statistics)

Despite having to overcome the negative stigma school-to-work has gained with its association with vocational education, there are several reasons why we should consider its potential as a preparation for college. First, the pedagogical arguments used to support school-to-work apply to all learning, not just learning for some students. (We shall discuss this issue in more detail in the following section of the report.) This suggests that the school-to-work approach can indeed improve learning even for those in apparently successful college preparatory programs. Thus even if these schools are not experiencing a crisis, significant improvements may be possible. This is certainly worth serious consideration.

Second, complacency about the college prep system is not warranted. With the exception of literacy skills, in which U.S. students appear to do well in international comparisons, even students in traditional college preparatory schools do not perform to the level of similar European students on comparable tests of academic skills (Bishop 1996, Ravitch 1995). Although there is much debate about the validity of many of the international comparisons made using standardized tests (Steinberg 1996; Berliner and Biddle 1995), experts at the National Center for Education Statistics state that "Generally the 'best students' in the United States do less well on the international surveys when compared with the 'best students' from other countries" when referring to science and math test scores (Medrich and Griffith 1992). Furthermore, research conducted over the past decades also suggests that students even in affluent suburban communities are decreasingly engaged with high school, as hard work and high academic achievement increasingly conflict with youth values and culture (Steinberg 1996). Given the escalating cost of higher education, improvements in the college preparation system could result in significant gains in efficiency.

More than 33 percent of all college freshman enrolled in BA/BS programs drop out after their first year. (American College Testing Service 1996)

Third, the high college dropout rate is one of the least discussed problems in the country's educational system. Data collected by the American College Testing Program (ACT) in 1996 indicate that more than 33 percent of all college freshmen enrolled in BA/BS programs drop out after their first year. Although college enrollment rates are at an all-time high with 70 percent of 1992 high school graduates enrolled in institutions of higher education (the majority in four-year institutions), many fail to graduate in the conventional four years. Kenneth Gray (1996) points out that among freshmen entering NCAA Division I universities in 1988, only slightly more than half (57 percent) had graduated six years later. He points to college dropout rates as high as two-thirds in states with high matriculation rates and predicts that, using aggregate graduation rates alone as an indicator, about one-half of those who enter baccalaureate education will fail. Thus, there is a tremendous amount of wheel spinning and wasted effort in college. This suggests that the current secondary school system could in fact do a much better job of preparing students for college, or perhaps help them decide to try something other than a four-year college or university. One of the central goals of the school-to-work

strategy is to help students think systematically about their goals and aspirations.

Fourth, almost one-half of college students work at least part-time while in school,[7] often in low-paid unskilled jobs having nothing to do with their studies. High school programs that help students define their goals and give them some work-related skills could give young people more access to higher skill and higher paying jobs while in college. Higher pay itself benefits college students (perhaps by reducing the hours that they have to work), but more skilled jobs have an additional benefit. These jobs have a higher chance of contributing to the student's substantive education, rather than conflicting with it as low-skill jobs often do.

According to college admissions personnel, traditional admissions criteria such as GPA, credit hours, and course titles are becoming less meaningful.

Fifth, there are growing complaints about the college admissions system. College admissions personnel say that the traditional admissions criteria such as GPA, credit hours, and course titles are becoming less meaningful. For example, state officials in Oregon point to "grade inflation" and a lack of comparison across schools (Oregon State System of Higher Education 1994). Students are increasingly becoming aware of ways to improve their GPA by a judicious selection of courses and instructors. Given this new way of "working the system," an impressive record does not necessarily mean that students have mastered the knowledge and skills required for college. Furthermore, it does not indicate that they have taken a challenging curriculum. GPAs are rising in Oregon at such a pace that grades are losing their meaning.[8] The growing use of admissions consultants by students applying to elite colleges complicates the evaluation of applications. Consultants can help write or edit the application essay and can plan portfolios of extracurricular activities tailored to particular colleges.

[7] In 1992, 47 percent of full-time college students (age 16 to 24) were employed; 26 percent were working 20 or more hours per week (U.S. Department of Education, National Center for Education Statistics 1994 Table 49-2). These numbers represent a steady increase since 1970 when rates were 34 percent and 14 percent, respectively.

[8] Oregon colleges are being forced to remediate 42 percent of its students in math and 27 percent in writing even though they are admitted as being fully qualified (Oregon State System of Higher Education 1994). This appears to be the case throughout the country. According to the American Council on Education, 90 percent of all private and 95 percent of all public four-year colleges schedule remedial courses. The number of students taking these courses range from 40 percent to 70 percent of entering freshmen (Gray 1996).

Sixth, the argument in favor of school-to-work must go beyond the claim that it is good for preparing children (usually other people's children) for work. For school-to-work to develop into a broad reform it must be seen as an equally good path to quality baccalaureate programs. Given the importance placed on colleges and the prominence of the most competitive and prestigious, any program that is perceived to close postsecondary opportunities will be considered an inferior track that is directed toward only those who cannot succeed in the traditional academic stream. Thus as long as school-to-work does not close future options for selective colleges, while benefiting the large majority of students, it would still make sense, from the point of view of society as a whole, to promote school-to-work in elite high schools. It will become an important reform if people are convinced that it is an effective educational strategy for a wide range of students of all abilities and socioeconomic backgrounds.

Characteristics of School-to-Work

A good deal of the skepticism of school-to-work is a result of misconceptions about its characteristics. School-to-work has three basic elements. The first is referred to as "learner centered" or "authentic" teaching. The second is guided educational experiences outside the traditional classroom in the surrounding community and particularly the workplace. And the third is a structured approach to help young people begin to form ideas about their interests, to think about the work that they would like to do, and to understand how they can achieve their aspirations.[9] Each of these elements will be discussed in more detail below.

School-to-work has three basic elements: "learner centered" or "authentic" teaching; guided educational experiences outside the traditional classroom, particularly in the workplace; and a structured approach to help youth begin to form ideas about their future aspirations and how to achieve them.

Authentic teaching and learning

Over the last decade, school reformers have advocated a shift from a "teacher-centered" pedagogy, in which the teacher transmits information to the student, toward a "learner-centered" approach in which the student is much more actively engaged in learning and in the discovery or "construction" of his or her own knowledge. This is referred to as "constructivism" or "authentic" teaching and has been made popular in particular by the Coalition of Essential Schools. In a recent report published by the Center on Organization and Restructuring of Schools, Fred Newmann and Gary Wehlage (1995) argue that authentic pedagogy "emphasizes teaching that requires students to think, to develop in-depth understanding, and to apply academic learning to important, realistic problems" (p3). Linda Darling-Hammond, the Co-Director of the National Center for Restructuring Education, Schools, and Teaching (NCREST), contends that teachers are "focusing on more challenging and exciting kinds of

[9] These three elements differ somewhat from the framework initially endorsed under the School-to-Work Opportunity Act of 1994. The Act was focused on three more structural components: work-based learning, school-based learning, and connecting activities. In the Act's formulation, career guidance is considered a connecting activity. We have not emphasized these three because they are not particularly relevant to preparation for college. For a review of school-to-work concepts and models see Bailey 1995; Katz et al. 1995; Stern, et al. 1995; Office of Technology Assessment 1995; Pauly, Kopp, and Haimson 1994; and Tsuzuki 1995.

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Teachers "are focusing on more challenging and exciting kinds of learning, helping students to actively construct, use, and generate their own knowledge...They are creating communities of learners engaged in research and reciprocal teaching that empower students to seek their own answers and pose their own questions." (Linda Darling-Hammond 1996)

students to actively construct, use, and generate their own knowledge . . . They are creating communities of learners engaged in research and reciprocal teaching that empower students to seek their own answers and to pose their own questions. And they are finding new ways to reach diverse learners more effectively, developing personalized structures and adaptive teaching strategies to support their success" (1996 AERA Presidential address). In practice, authentic teaching often involves long-term projects, usually done in groups, about difficult issues that require some complex written, symbolic, or oral final presentation.

Newmann and Wehlage (1995) state that authentic learning involves the three components described below:

- ***Construction of knowledge:*** When students construct knowledge, they organize, synthesize, interpret, explain, or evaluate information. The conventional curriculum excessively emphasizes reproducing knowledge.

- ***Disciplined inquiry:*** Disciplined inquiry uses an established knowledge base. It strives for an in-depth understanding of problems; superficial acquaintance with knowledge is inadequate to solve problems. Unlike much of the communication in school which asks only for brief responses, it uses complex verbal, symbolic, and visual languages.

- ***Value beyond schooling:*** Authentic achievements must have aesthetic, utilitarian, or personal value beyond showing the teacher, the parent, a college, or an employer that the student has mastered the requirements of schooling.

In the literature on education reform, there are now many examples of authentic learning. Students design a roller coaster after a visit to an amusement park and discover that the ride they wanted to build would not be safe; teams of students representing loyalists, federalists, plantation owners and other stakeholders draft

their own constitutions followed by debates among the teams about the changes that each team has proposed in the original constitution; students working in teams have six weeks to complete a contemporary interior design for an historic Victorian house (Newmann and Wehlage 1995, Berryman and Bailey 1992, Stasz et al .1993, Darling-Hammond 1995).

Although there are wide-ranging benefits to authentic teaching, this approach is not free of controversies and disagreements regarding teaching styles and content coverage; for example: "if we spend a month arguing over the Constitution, we will never get a chance to discuss the Civil War." It takes a great deal of time for students to "construct" their own knowledge, and it is difficult to know and evaluate exactly what it is that they will construct. Anderson, Reder, and Simon (1996) argue that much knowledge can be taught more efficiently using more traditional methods rather than in "complex learning situations." Hunt (1995) points out many practical problems associated with planning a curriculum based on the project approach. But these critics tend to argue against the most ambitious claims of education reformers, not the basic principles. In most cases they agree that a more modest constructivist pedagogy, often making use of project-based learning, does have an important place in education even if it must also coexist with more traditional approaches.

Thus, the learner-centered approach to teaching is now widely, although not universally, accepted as at least a desirable objective and is not seen as being in conflict with learning academic skills. For example, it plays an integral part in New York State's New Compact for Learning that addresses curriculum and teaching strategies for all students throughout the state. Moreover, there is no conflict between authentic teaching and school-to-work. Indeed, the arguments in favor of authentic teaching particularly support the school-to-work approach. For example, New York's Career Development and Occupational Studies Framework (part of the New Compact) is seen as "both supporting the preceding six (academic) frameworks and being a delivery system for them" (The University of the State of New York 1995, piii).[10]

[10] The Framework applies to all students; is not directed toward a specific subject area or particular group of students; and includes standards, performance indicators, and performance tasks that cut across all disciplines and are consistent with the Board of Regents Goals for Elementary, Middle, and Secondary School Students.

Experience outside the classroom

The second central element of school-to-work is guided educational experiences outside the classroom, in the community, and particularly in the workplace. The best-known approach to this involves internships or apprenticeships in which students spend some time employed at a worksite. To carry this out, program operators must find placements for their students, which is often difficult (Bailey 1995). Nevertheless, it is important to emphasize the wide variety of possibilities that exist. The programs that demand the most of employers are youth apprenticeships in which students spend most of their time on the job with some related classroom instruction. While this is the German model that indeed inspired much of the early experimentation with school-to-work, there are very few youth apprenticeship programs in the U.S., and the vast majority of the current projects funded under the School-to-Work Opportunities Act are much less intensive. Most often students receive organized and guided work experience in short-term internships that meet a few hours a week during the junior or senior years, or in some cases alternate periods of full-time work with periods of full-time school. In some programs students have a variety of three- or four-week rotations in different worksites or departments. In addition, there are experiences that require even less of employers including job shadowing, mentoring relationships with adults, community service activities, school-based enterprises, and in-school simulations of work experiences. One interesting approach includes attempts to enhance the educational value of the jobs that many young people already have. This involves using seminars and other in-school activities to analyze and reflect on situations and experiences that students encounter at work or in other activities. Some high schools end the senior year early in the spring and send students out to internships.[11]

One of the most common approaches, especially in large cities, is the development of high schools based on occupational or industry themes. New York City has high schools organized around health occupations, aviation, financial and business services, and many others (Heebner, et al. 1992). In smaller communities industry-oriented programs are often organized as schools-within-schools. Philadelphia and areas in California have established career academies that combine academic content with the technical skills necessary to obtain entry into certain industries

[11] See Stern, et al. 1995 for descriptions of alternative models.

or clusters of occupations. To be sure, students often hope to find work in these areas after high school, or at least during college, but educators who organize these programs believe that the industry orientation provides a context and coherence to the curriculum and stronger connections to the world outside the classroom. Learning benefits accrue to all students, not just those seeking employment upon high school graduation (Stern, Raby, and Dayton 1992; Tsuzuki 1995; Katz et al. 1995). At its best, workplace experiences can provide the setting for addressing authentic problems and a clear connection to "value outside the classroom," as Newmann and Wehlage (1995) put it. Using the workplace to teach academic skills can also be a motivational tool for students, showing them how their academic skills can be used outside of the classroom.

Workplace experience can provide a motivational setting for students to learn academic skills, solve authentic problems, and gain a clear application for their classroom knowledge.

The importance of experience outside the classroom is incorporated into New York State's *New Compact for Learning*. The curriculum required to engage students in this integrated learning process includes hands-on opportunities to learn about the relationships between academic knowledge and technical skills as well as time to report upon and/or demonstrate what has been learned and how it can be applied to other situations. The authors of the compact argue that the "ability to make connections with and across disciplines and between school tasks and real-life tasks is an essential skill to manage one's personal and professional life effectively." Achieving the integrated-learning standard, one of the three standards set forth under New York's New Compact for Learning, and an integral part of its framework, requires that "students will understand and demonstrate how academic content is applied to real-world and workplace settings" (The University of the State of New York 1995, pp. 4, 15).

Packer and Pines (1996) argue that many traditional educational practices focus on contrived applications of academic material that are never encountered in the workplace. The use of more realistic workplace applications will result in better, more prepared learners and workers. This is particularly true of traditional applications in mathematics and science. Both the National Council of Teachers of Mathematics and the American Association for the Advancement of Science are encouraging the integration of examples of workplace problem-solving into the

academic standards they have established.[12] More and more individuals are beginning to understand the natural applications in the world of work for academic curriculum. Although more data need to be collected on the learning outcomes of using an applied approach to teaching, many are starting to see that this connection strengthens the amount of knowledge that is learned, understood and retained (Packer and Pines 1996).

Susan Forman and Lynn Steen (1995), the Director of Postsecondary Programs and the Executive Director of the Mathematical Sciences Education Board, argue that "mathematics in school should closely resemble mathematics at work," and that "mathematics required for work can provide strong preparation for college" (p221). Work-oriented mathematics is more consistent with current innovative approaches to mathematics teaching.

> Mathematics at work in ordinary contexts typically involves real data with realistic measurements expressed in common units. The technical skills required to deal with these data are relatively elementary—measurement, arithmetic, geometry, formulas, simple trigonometry. The problem solving strategies, however, often require a cognitive sophistication that few students acquire from current school mathematics: planning and executing a multi step strategy; consideration of tolerances and variability; anticipation and estimation of relevant factors not immediately evident in the data; and careful checking to assure accuracy (p221).

In comparing the roles of school-based and workplace learning in the acquisition of knowledge, Scribner and Sachs (1988) investigated the non-formal educational activities embedded in work practices. They found suggestive evidence that both formal study and practical work experience make educational contributions and in some cases actually function equivalently in preparing individuals for certain aspects of work performance. Their study, although not conclusive, went "a great distance toward showing that, without higher education or extensive training,

[12] For example, one of the five student goals established by the National Council of Teachers of Mathematics is "becoming a mathematical problem solver." This means that "the development of each student's ability to solve problems is essential if he or she is to be a productive citizen" (NCTM 1989, p6). One of the standards developed by the National Research Council in their science standards is "science as inquiry" where students "experience science in a form that engages them in the active construction of ideas and explanations and enhances their opportunities to develop the abilities of doing science" (National Research Council 1996, p121).

people can achieve conceptual understanding on the job" (p50). In their observations of both formal and informal training activities in the stockroom of an electronics firm, Scribner and Sachs illustrate how the larger social world of the organization and the complexity of the industrial setting actually "require workers to operate within a number of knowledge and practice domains . . . (and) . . . furnish an unplanned yet crucial way for workers to learn to be workers and to master the non-routine, beyond-the-ordinary aspects of their jobs" (p53). Although school-to-work advocates do not call for work experiences without coordinated classroom work, the research by Scribner and Sachs suggests the potential for using work-based pedagogy to teach even theoretical and conceptual material. Nonetheless, the authors do warn of the limitations of training that is not designed to fulfill one of the basic educational goals of maximizing human development.

The larger social world of the organization and the complexity of industrial settings require workers to operate within a number of knowledge and practice domains and to master the non-routine, beyond-the-ordinary aspects of their jobs. (Scribner and Sachs 1988)

Work-based education has a long history in the United States. Programs such as cooperative education were first recognized by federal authority in 1917 in the Smith-Hughes Act. A Government Accounting Office survey of state directors of cooperative education in 1989/90 estimated "about 430,000" students were involved in some form of high school cooperative education program nationwide (Stern et. al. 1995, Chapter 2). In addition, over 200,000 people are enrolled in construction and other types of registered apprenticeships, a form of guided work experience which has existed since the medieval guilds. These apprentices are often in their late 20s and many are even college graduates (Bailey 1993). But neither cooperative education nor apprenticeship is perceived to be effective in teaching academic material or preparing students for college.

The same cannot be said for guided workplace experiences that come through professional education programs. Internships, guided practicum, and various types of work experience are central components of education for most professions. Indeed, these components "blend" together to form the "complex relationship between student, teacher and curriculum content that identifies formal professional education" (Schein 1972, p98). Educators do not question the

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premise that an education which combines school and guided work can provide a deep and broad understanding for lawyers, doctors and medical workers at all levels, teachers, architects, and professors. Indeed no one would recommend a doctor who had no practical experience even if he/she had earned A's in biology, organic chemistry, and anatomy. When we want someone to be an effective practitioner—that is, to put knowledge to use—we do not question the need for appropriate experience, yet many fear that work experience for high school students threatens their education. Furthermore, most people have fully accepted the structure established under professional education, which places an equal value on self-paced, independent and concentrated study; small-group and seminar-tutorial methods; project or problem-centered study; practicum or clinical experience; work-study programs; off-campus study; co-op programs; and internships (Schein 1972).

Career and interest exploration

The third component of the school-to-work approach involves systematic exploration of student interests and possible career goals. The purpose of career exploration is not to force high school students to make irrevocable choices about future occupations. Career exploration should give young people a chance to think systematically about what might interest them and, just as important, give them more realistic information about what adults do. Young people have misconceptions about adult work and what is necessary to be able to achieve occupational or other goals. Internships and other types of experiences can help students gain a more realistic understanding of the world outside the classroom. On the job, students can see first-hand what adults are doing and can often decide that some particular activity is or is not for them. Field trips, class visits from outsiders, and research projects can also be useful. These types of activities can start before high school. With respect to college, students with some sense of their goals can make a better selection of their postsecondary activities and probably make better use of their time in college. This conclusion is supported by evidence from a study of New York City career magnet schools, which shows

The purpose of career exploration is not to force high school students to make irrevocable choices about future occupations but to give young people a chance to think systematically about what might interest them and give them realistic labor market information.

that graduates of the program had completed more college courses two years after graduation than similar graduates from traditional comprehensive schools. (These results are discussed in more detail below.)

In high schools, for the most part, students pursue their interests and passions outside of the classroom—on the athletic field, in their churches and communities, in the drama club, and in other extracurricular or personal activities. A key aspect of the school-to-work model is that it is designed to use those interests to promote academic learning, to integrate student aspirations into the academic pedagogy. For this to work, it is important that students get a chance to explore and reflect on their interests.

One advantage of the current school-to-work movement is that it offers an opportunity and an incentive to improve and focus the counseling and career exploration functions. Indeed, significant changes will need to be made if school-to-work is to achieve its potential. Belinda McCharen (1995) points out that "a great deal of confusion as to what constitutes a comprehensive career guidance program continues to exist today among policy makers, school administrators, and practicing school counselors." Guidance counselors face an increasingly challenging environment as the ratio of student to counselor increases and students bring in more social and economic problems. In addition, school counselors usually have little first-hand experience in the world of work—a world to which they are attempting to expose their students. To minimize these problems, some schools have successfully expanded the guidance program into the school as a whole using teachers as advisors (McCharen 1995). This approach, in addition to being logical, offers the possibility of better career counseling since teachers not only know more of the career details but have more contact with the students than do counselors. There are, however, problems with giving already overburdened teachers more responsibility.

Examples of School-To-Work Programs That Teach Academic Skills and Prepare Students for College

We have argued that the school-to-work model can be used to teach rigorous academic skills and to prepare students for college. Indeed, some of the most highly regarded school-to-work programs are explicitly designed for college-bound students. The internships in these programs are seen as assets for college applicants.

Many of these school-to-work programs have competitive admissions processes which consider attendance; test scores (PSATs or some sort of behavioral or critical thinking tests); writing samples; personal statements; GPAs; minimal levels of math and science such as algebra and chemistry; and teacher and guidance counselor recommendations. Internships usually involve work on a research project including formal presentations of the results and conclusions. This combination of activities not only gives students the opportunity to work (alone and/or in teams) on original problems but to develop and integrate many of the academic and technical skills they have learned. In many high schools, the more successful students can complete most of their regular high school graduation requirements in their junior year, and program administrators believe that well-designed internships can keep successful students interested in school during their last years.

The nature of student projects demonstrates the level of learning that is taking place. The Thomas Jefferson High School for Science and Technology in Maryland, for example, offers an integrated program of studies in biology, English and technology linked by an environmental issues forum. Students work as partners with resource managers at the Mason Neck National Wildlife Refuge and the Mason Neck State Park to collect data and monitor the daily activities of various species that inhabit the region. Students search existing literature to establish a hypothesis related to a real world problem, design an experiment to test their hypothesis, run the experiment, collect and analyze data, draw conclusions, and produce a written document that communicates the results of the experiment. The students are even responsible for determining what information and resources are needed

and how to access them. Student projects have included making plans for public education programs dealing with environmental matters, finding solutions to problems caused by encroaching land development, and making suggestions on how to handle the overabundance of deer in the region. A sight-impaired student used computer-aided design to propose structural changes to the outdoor environmental center that would make it more accessible to students with disabilities.

At the New Visions Careers in Health program in Rochester, New York, a student in a medical internship studied the intra-aortic balloon pump and prepared a presentation on this subject to the class. She was assigned a great deal of reading to help her understand the cardiac unit and a patient to follow every day. She gave daily reports to the staff on the patient's condition. It is a very demanding department and the student said that at first she did not want to do all of the extra reading, but then she realized that she was getting a head start on college. She is reading the same medical texts that medical students read.

Students at the Blair Science, Mathematics, and Computer Science Magnet Program in Maryland work at research institutions such as the Carnegie Institute, the National Oceanic and Aerospace Association, the National Institutes of Health, the National Institutes of Standards and Technology, Goddard Space Flight Center, Walter Reed Army Center, and Army Research Labs. They begin developing their year-long research projects during the second semester of their junior year and have the option of completing them either off-campus at one of the local laboratories or at the on-campus lab. If they choose to work off-campus, each student is required to have a mentor that he/she interviews and selects. Senior projects during the 1996 school year included "Computerized Design of the Maryland Functional Math Test;" "The Role of Surfactants in Sonodynamic Therapy;" "Two-Way Videal Transfer Over Fiber Optic Cable;" "Operation Understanding, D.C.;" and "The Effects of Parental Post-Traumatic Stress Disorder in Police Officers' Siblings."

In schools and programs such as Thomas Jefferson, New Visions, and Blair, students present their work orally in symposium format to parents, teachers, peers, employers, and prospective students. These presentations allow them to begin developing the kind of communications skills that they will use throughout their lives—speaking to a range of audiences with different interests, uses of information, and levels of expertise. In the traditional classroom setting, the

teacher is the only audience, which makes the communication less dynamic and true-to-life.

Even the prestigious Phillips Academy in Andover, Massachusetts requires all of its students to work at the school for two periods a week. More than half of the students at the school participate in community service activities, and a modest number choose one semester off-campus internships (Office of Technology Assessment 1995).

For students with well-formed interests and goals, participation in these types of activities can strengthen their educational experience. In our field work, we have met students who joined a school-to-work program because they wanted to be pediatricians, executives in the travel industry, nurses, or engineers. Through school-to-work programs, these students get a chance to develop their interests and to try out their aspirations. They sometimes find that their original career goals are not what they wanted. Additional, practical knowledge of career demands, when gained prior to college entrance and the declaration of a major, has the potential to eliminate many wasted dollars and years spent (by parents and students) on "changed majors." Work-based experience can give students a chance to focus their classroom work as well. Furthermore, these types of activities can strengthen a student's college application. One teacher from a highly competitive high school told us that colleges receive many applications from students with excellent academic records. Participation in internship programs can help differentiate among these many applications.

Another group of students that can benefit from school-to-work are those who are disaffected by the standard academic curriculum and pedagogy.

Another group of students that can benefit from school-to-work are those who are disaffected by the standard academic curriculum and pedagogy. Many potentially talented students are uninterested in school work and consequently do not do well in their classes. They often become convinced that they do not have the ability to succeed in an academic environment. These types of students can be found in even the most college-oriented secondary schools. In our own field work we have found cases in which students, with no intention of going on to college, joined school-to-work programs because they saw them as an alternative to boring class

work. Once they began to work in a more concrete setting that sparked their interest, they found that in fact they were effective learners and could take on real responsibilities.

In interviews that we conducted with students in internships, we found many who stated that the program had changed their attitudes about school. They had been thinking about dropping out, but were now enthusiastic, and D's and F's changed to B's and even A's (see Olson, forthcoming, for many examples of improved academic performance as a result of workplace experiences). Many students value the chance to be treated as adults, and many appreciate their relationships with the counselors and teachers who work with them to relate their academic learning to the worksite experience. These positive experiences influenced their academic learning as well. In one hospitality program, we interviewed two students who, according to themselves and their teacher, had been completely uninterested in school. They had both hoped to open a business (perhaps at a ski area) after high school. These students found an internship with an individual who was starting a catering business, and they both became deeply and enthusiastically involved with all aspects of this business and were actually running the business for periods when the owner was out of town. While they still complained about the reading they had to do in their program, they persevered. Through this experience they realized that it might make more sense to work in the management of another company before they started their own, and they realized that for this they needed more education. Thus their experience gave some reality to their ambitions and also provided them a reason to continue their education.

As Michael Jackson, director of Fremont High School's Media Academy in Oakland, California, stated, "Many of my students come to me at-risk and leave college bound." Perhaps this type of change in goals and aspirations of the student is the most obvious case in which school-to-work promotes academic learning and enhances a student's chances of going to college.

Empirical Evidence

The enthusiasm for the school-to-work strategy among policy makers, researchers, and some teachers at this point comes, first and foremost, from the enthusiasm and excitement shown by the students who have participated in school-to-work activities. Indeed some program operators are concerned that when word gets out about the opportunities associated with school-to-work, high-achieving students will become increasingly interested, thereby reducing the opportunities for other students. For example, at Chicago's High School of Agricultural Science, where one-third of the students are involved in internships with local area businesses, the principal complained that the internships were so popular that they were attracting her best students—those that traditionally were involved in in-school activities such as the yearbook and school newspaper.

Many school-to-work programs in fact have high college attendance rates. For example, Chicago's High School of Agricultural Science sent 80 percent of its students to college in 1996, 60 percent of whom went to four-year colleges.[13] The Philadelphia Academies send nearly 60 percent of their students to postsecondary schools.[14] About 85 percent of the graduates of New York City's Cooperative Education enroll in college. A 1995 evaluation of three youth apprenticeship programs found between 69 and 84 percent of the graduates enrolled in some form of postsecondary training or education soon after high school; the highest postsecondary rate was for an inner-city school where postsecondary enrollment rates are usually low (Jobs for the Future 1995).

While these figures may seem high to many who think of school-to-work as a vocational program, such statements do not reveal the college attendance rate if the same students had enrolled in a traditional school or program. There is now a small but growing body of research that evaluates school-to-work programs using either observationally equivalent comparison groups or random assignment methods.

[13] This is a school that admits many students who traditionally are not headed for college. Admission is determined by lottery and the school has no cafeteria, no library and no gym.

[14] Data from Chicago and Philadelphia were obtained from phone interviews with school personnel.

Relevant systematic research that measures direct effects of innovations in teaching is beginning to emerge. The recent work of Newmann and Wehlage (1995) shows gains due to the use of authentic pedagogy both in traditional test scores and in their measures of "authentic learning." Programs that include work-based components also have positive results. Graduates of the California Academies, despite working more hours during high school than a comparison group, are just as likely to attend postsecondary schooling according to a study by Stern, Raby and Dayton (1992). A recent evaluation of the Manufacturing Technology Partnership (MTP) Program in Flint, Michigan, also found positive effects (Hollenbeck 1996). The program enrolled 11th and 12th graders and supplemented a formal school-based curriculum in manufacturing with work-based experiences at General Motors. The evaluation, which compared participating students to a similar comparison group of non-participants, found that the average high school grade point average and class rank were higher for MTP students and that the program dramatically reduced absences.[15]

New York City's Career Magnet schools provide a particularly compelling opportunity to study the effectiveness of programs with important school-to-work characteristics. New York high school students must apply for admissions to the career magnets. One half of the students are selected by lottery. The lottery losers for the most part attend their local area high school. This selection process sets up a natural experiment in which placement into the treatment group (those accepted at the magnets) and the control group (the lottery losers who attend their local high schools) is determined by a random process (the lottery).[16] An evaluation using this methodology found that programs that have school-to-work features do have important positive effects on academic test scores. Among other findings, the project concluded that career magnet graduates were more likely to have declared a college major and earned more college credits when they went to college than their counterparts from area comprehensive high schools with no career focus or exposure. These magnet students were, on average, employed more months after graduation and earned significantly more college credits. [17]

[15] Most studies find that working a moderate number of hours per week has small positive or no effect on academic achievement, but some studies do find negative effects (Greenberger and Steinberg 1986, for example). See Stern et al. 1995 for a review of the research. However, much of this research focuses on employment in general rather than specifically designed work experiences and internships, and is therefore not relevant to the issues addressed in this paper.

[16] For a detailed description of the sample and methods see Heebner et al. 1992.

[17] Unpublished data from in-process research being conducted by Anna Allen and Robert Crain and funded by the Department of Education through the National Center for Research in Vocational Education at the Institute on Education and the Economy, Teachers College, Columbia University.

Confronting the College Admissions Process

Even if the school-to-work strategy is effective in teaching the academic skills needed to prepare for college or in motivating students to apply for college, parents and teachers fear that colleges will not recognize the achievement of those competencies. Indeed, despite efforts to reform high school graduation requirements in Pennsylvania, Ohio, New York, Oregon, and Minnesota over the past few years, the college admissions process is still firmly rooted in Carnegie units, a framework that poses strong obstacles for school-to-work programs. As one researcher, critical of the Carnegie approach, notes,

> The Carnegie unit continues today to exert formidable influence over much that is crucial to teaching and learning—the length of the class period, the school day, and the school year, as well as the time expended to get a diploma, the way knowledge is organized for instructional purposes, what students learn and, of course, admission to college (Maeroff 1994).

Because of the time needed for internships or other types of work experience, school-to-work programs, as many are presently constituted, also make it difficult for students to take advanced placement (AP) courses. School-to-work activities often compete with extracurricular activities, which, along with AP courses, are important for college admissions. Thus, counselors in even some of the best known school-to-work programs often advise students with selective-college ambitions not to enroll in school-to-work programs. In fact some of the programs that the Institute on Education and the Economy has investigated preclude students from participating in AP courses. In one case, a student we interviewed said that everyone involved, including her teachers, parents, and counselors, thought that educationally the school-to-work program would have been best for her, but they decided not to enroll her because it would prevent her taking the AP courses that she needed for college admissions.

Even if the school-to-work strategy is effective in teaching the academic skills needed to prepare for college or in motivating students to apply for college, parents and teachers fear that colleges will not recognize the achievement of those competencies.

Nevertheless, reformers have taken a variety of approaches to reduce the conflict between participation in school-to-work activities and admission to selective colleges. These strategies can be grouped into three broad approaches. The first is accommodation of the school-to-work program within the existing college admissions system, the second involves the communication between individual schools and colleges, and the third includes attempts at broad change in assessment and college admissions procedures.

Accommodation

This approach attempts to fit school-to-work activities into a traditional college preparatory program. It involves a combination of trying to "shoe-horn" school-to-work into traditional Carnegie units and including school-to-work activities with other traditional school activities.

For example, at Cambridge Rindge and Latin School in Cambridge Massachusetts, applied courses retain familiar academic labels to preserve the university's understanding of student transcripts—a course such as applied technology was relabeled physics and applied technology. In other cases, teachers in interdisciplinary courses give separate grades for the traditional subjects, that is, students in integrated social studies and language arts courses will get separate grades for English and social studies.

In some schools, internships are additional activities that take place after school or during summer vacation. Many students we interviewed have been willing to devote extra time to their school-to-work internships. Certainly in this strategy, internships can compete with sports or other extracurricular activities, although the internship can itself be seen as an extracurricular activity and treated as such on college applications. Some schools start internships during the second half of the senior year after college applications are complete. Moreover, many high school students already work. When this is true, internships, if they are paid, can replace typical youth jobs with less educational value than internships.

These attempts to accommodate school-to-work initiatives within a traditional college preparatory system have allowed the initial growth of school-to-work reform. Nevertheless, the compromises often create severe constraints. This has

led to attempts to get colleges to recognize the value of the school-to-work approach without trying to make it look like the traditional system—to convince colleges that the work component of their program has been effectively coordinated with the academic curriculum. Schools have tried to do this either through working with individual colleges or by working towards broader reform in college admissions procedures.

Individual relationships between schools and colleges

Relationships between individual schools and colleges are important to the college admissions process. The specific knowledge gained in these relationships is used by admissions committees to evaluate the significance of grades, recommendations, and extracurricular activities. In some cases, high school teachers and counselors have been able to take advantage of these individual relationships to overcome the skepticism among college admissions personnel regarding students' non-traditional records.

Many programs, especially those that are geared toward high academically achieving students, have had to open up communication channels with colleges on an individual student basis. Programs in the Cambridge Rindge and Latin School as well as the Blair Science, Mathematics, and Computer Science Magnet have found it necessary to include a cover letter with their students' transcripts and college applications explaining the details of a student's work experiences, research projects, and the interdisciplinary and applied curricula.

One example of the potential for connections between colleges and secondary institutions is the growing relationship between Fairdale High School Public Safety Magnet Career Academy and the University of Louisville. Students from Fairdale who are not admitted to the University based on academic credit and ACT scores can challenge the University's decision using their writing and math portfolios.[18] In 1995, seven students received admission based on their portfolios. One of the school's administrators stated that the openness of the University to this nontraditional method of admissions has had a positive impact on those students who are intellectually able to function in the university environment but simply fail to

[18] According to a state mandate, all students in Kentucky must develop portfolios.

perform well on timed tests. Similar benefits occur for females whose writing abilities often lift their math portfolio to a high level not indicated by test scores.

Reform in selection and admission procedures

Several states are now developing assessment and admissions systems that can more effectively evaluate the achievements of school-to-work students. For example, the Oregon State System of Higher Education (OSSHE) is developing a new approach to admissions that "replaces the traditional time-based proxies for learning, such as the Carnegie unit, with clearly specified statements of the knowledge and skills which students must master to be accepted into any of Oregon's seven baccalaureate-granting institutions" (1994, p1). The Proficiency-Based Admission Standards System (PASS) is a list of the knowledge and skills students need to be admitted to college. These standards, developed from an attempt to understand the relationship between school reform and college admission, were adopted in May 1994 by the State Board of Higher Education and will be used as a basis for freshman admission to OSSHE institutions in fall 2001. They involve six content areas and nine process areas.[19] A complete prototype of the assessment system, including detailed descriptions of the proficiencies and plans for an electronic transcripting and advising system, is planned for fall 1997.

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The University of Maryland system has developed an Office of Articulation whose primary goal is to "facilitate the movement of students between and among the educational segments" (Giles-Gee 1996). Faculty and administration at the University of Maryland have worked with the Maryland State Department of Education, Community College faculty, and business and industry leaders to identify knowledge, skills and employment opportunities; review curriculum; and create strong career pathways for students which include all branches of the State's educational system. Although the stakeholders have not reached agreement on credit for work experience and transfer credit for college

[19] The six content areas are math, science, social studies, foreign language, humanities/literature, and fine and performing arts. The nine process areas include reading, writing, communication competence (listening, speaking), critical/analytic thinking, problem solving, technology, systems/integrative thinking, teamwork, and quality work.

work performed in high school, they are working, like the Oregon system, to create a state system of high school assessment with an emphasis on academic proficiency and "skills for success" to replace the traditional Maryland Functional Tests.

If assessments include more complex material such as papers, projects, and portfolios, it may be that students with a well designed school-to-work experience will look better than students in traditional programs.

Wisconsin is now in the process of studying alternative assessments by slowly integrating them into the college admissions system. A state study is now using both portfolios and traditional assessment methods in admitting prospective students as a way for colleges to get more comfortable with alternative assessments.

Faculty at Boston's Pro Tech are currently working with the North East Association of College Admissions Counselors to give colleges a different perspective on the work component in students' schooling experience. The school is using the success of preceding students as examples to state their case and show that a work component, tied to a strong educational curriculum, is more significant than mere after-school jobs.

Ultimately, the problems of connecting secondary and postsecondary institutions will have to be addressed through innovations in standards and assessment. All of the state programs mentioned above involve developments in competency-based assessments. Moreover, this is also consistent with a much broader movement in education towards the development of "authentic" assessment (Darling-Hammond 1995). If assessments include more complex material such as papers, projects, and portfolios, then it may be that students with a well designed school-to-work experience will look better than students in traditional programs. Colleges already appreciate outside interests and commitments. In principle, school-to-work tries to integrate such interests with academic learning. Assessments that can capture that integration should be of particular interest to colleges.

Conclusion

The school-to-work strategy is still evolving. Indeed reforms have only just begun to address the potential for using school-to-work to prepare students for college. At this point, many school-to-work programs conflict with admissions to selective colleges, although this is not necessarily because such initiatives are not equally as or even more effective in preparing students for college and further learning. The evidence that we do have suggests that if school-to-work programs are well planned, students can learn academic skills, earn high grades, score well on tests, and gain access to college. Widespread acceptance of school-to-work as a strategy for preparing students for selective colleges will ultimately require significant changes in assessment and college admissions procedures. Although these are long-term goals, there are many steps that can be taken right now to improve this reform's potential to prepare students for college and to convince students, parents, and teachers that enrollment in a school-to-work program will not happen at the cost of college aspirations.

First, there remain many open questions about the design and implementation of the school-to-work model. What is the best balance between an experience-based individualized approach to education and a more traditional approach that emphasizes learning information? What is the appropriate balance between classroom work and experiences outside the classroom? How can the educational value of experiences outside the classroom be enhanced? What are the best methods for training teachers? How can the appropriate participation of employers be secured? Educators and employers are working on all of these problems. As progress is made and documented, it will be easier to make the case for school-to-work.

Second, the school-to-work movement needs to be better integrated into broader education reform efforts. This is not only to diminish the negative connotations that school-to-work has received through its association with vocational education but allow for a broader base of feedback on implementation issues. Educators are developing new approaches to school organization, assessment, and college admissions. While in many cases these remain controversial, they are not usually seen, as school-to-work is, as a threat to academic learning. School-to-work is

entirely consistent with many of these developments and needs to be viewed as such.

Third, secondary school personnel need to continue to work with colleges to reduce the conflicts between school-to-work and the admissions system. Some progress can be made by trying to accommodate the reforms to the current system. Individual schools can improve their communication with the colleges with which they work, but in the end broader changes in college admissions will probably be necessary.

Finally, skeptics are justified in asking for more systematic evidence. While it is understandable that reformers, government agencies, and foundations want to move ahead with innovative programs rather than waiting for time-consuming studies, this pressure to expand without substantial proof of effectiveness should not deter programs from collecting student outcome data to be used in the future. Although there are still many open substantive questions that need to be resolved, school-to-work represents a significant change in educational strategies with the potential to benefit all students by better preparing them for college and career opportunities.

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